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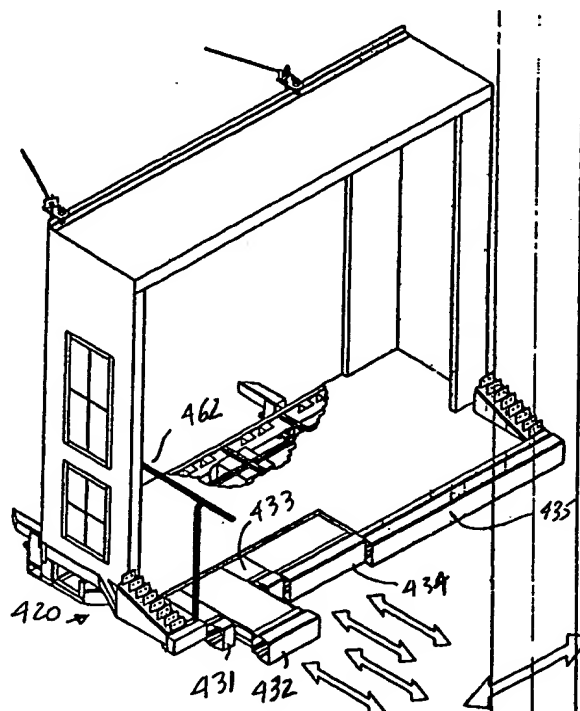
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**Published***Without international search report and to be republished upon receipt of that report.*(54) Title: **AIRCRAFT PASSENGER BOARDING BRIDGE SYSTEM**

## (57) Abstract

An aircraft passenger boarding bridge (310, Fig. 13) includes a cab portion (420) which can slide laterally and includes retractable floor members (421, 432, 433, 434) to allow a single bridge system to be used for both commuter aircraft and jet airplanes.



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## PATENT APPLICATION

## TITLE OF THE INVENTION

## AIRCRAFT PASSENGER BOARDING BRIDGE SYSTEM

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## CROSS-REFERENCE TO RELATED APPLICATIONS

Priority of our US Provisional Patent Application Serial No. 60/080,349, filed 1 April 1998, and US Patent Application Serial No. 09/085,997, filed 27 May 1998, both incorporated  
10 herein by reference, is hereby claimed. In the US, this is a continuation-in-part of US Patent Application Serial No. 09/085,997, filed 27 May 1998.

## STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable

## REFERENCE TO A "MICROFICHE APPENDIX"

15 Not applicable

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The present invention relates to airports. More particularly, the present invention relates to an aircraft passenger boarding bridges.

## 20 2. General Background of the Invention

Aircraft passenger boarding bridges usually are usable with jets or small commuter planes, but normally a single aircraft passenger boarding bridge cannot work with both a jet and a small commuter plane. In fact, the inventors believe that currently there are no passenger boarding bridges to allow passengers to board or de-board small commuter planes directly from  
25 a passenger terminal - instead, passengers must enter and exit small commuter planes via stairs on the runway.

The following US patents are incorporated herein by reference:

3,046,908; 3,110,048; 3,683,440; 4,490,869; 4,817,223; 5,004,188; 5,184,366; 5,226,204; and 5,267,368.

## 30 BRIEF SUMMARY OF THE INVENTION

The apparatus of the present invention solves the problems confronted in the art in a simple and straightforward manner. What is provided is an aircraft passenger boarding bridge

comprising a walkway having a first end and a second end, the first end for connecting to an airport building; a cab portion connected to the second end of the walkway for connecting the walkway to an airplane, the cab portion having sliding means for allowing the cab portion to slide laterally and having retractable floor members. The sliding means and the retractable floor members allow the aircraft passenger boarding bridge to be used for both commuter aircraft and jet airplanes. Preferably, there are at least two retracting floor members, one for each railing of the stairway of a commuter aircraft. Preferably, there is also a retracting floor member between the two retracting floor members for each railing, approximately the width of the space between the two railings. Optionally, a pivoting floor can be provided to maintain a level position relative to the ground.

In another embodiment, an aircraft passenger boarding bridge apparatus comprises a cab portion connectable to an aircraft passenger boarding bridge walkway for connecting the walkway to an airplane, the cab portion having sliding means for allowing the cab portion to slide laterally and having retractable floor members. Preferably, there are means for bolting the cab portion to an aircraft passenger boarding bridge walkway. Preferably, there are at least two retracting floor members, one for each railing of the stairway of a commuter aircraft. Preferably, there is also a retracting floor member between the two retracting floor members for each railing, approximately the width of the space between the two railings. Optionally, a pivoting floor can be provided to maintain a level position relative to the ground.

The present invention cleverly solves the problem of providing passenger access between an airport terminal and transporting aircraft of differing size and specifications, such as large commercial airliners, smaller commuter jets, and turbo prop aircraft currently in service with most commercial airline carriers today.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

For a further understanding of the nature, objects, and advantages of the present invention, reference should be had to the following detailed description, read in conjunction with the following drawings, wherein like reference numerals denote like elements and wherein:

Figure 1 is a perspective view of a first embodiment of the apparatus of the present invention;

Figure 2 is a perspective view of a second embodiment of the apparatus of the present invention;

Figure 3 is a perspective view of a first embodiment of the kit apparatus of the present

invention;

Figure 4 is an assembly drawing of the apparatus of the present invention;

Figure 5 is a top view of the apparatus of the present invention;

Figure 6 is a top view of the apparatus of the present invention;

5        Figure 7 is a perspective view of the second embodiment of the apparatus of the present invention;

Figure 8 is a side view of a hand rail safety cover of the present invention;

Figure 9 is a front view of the hand rail safety cover of Figure 8;

Figure 10 is a perspective view of the hand rail safety cover of Figure 8;

10       Figure 11 is a perspective view of the present invention showing a barrier system in a stowed position;

Figure 12 is a perspective view of the present invention showing the barrier system in an open position;

15       Figure 13 is a top view of the present invention showing a single station bridge in various positions;

Figure 14 is a side view of the present invention showing the single station bridge of Figure 13;

Figure 15 shows the structural skeleton of a preferred embodiment of the present invention;

20       Figure 16 is a perspective view of a second preferred embodiment of the present invention; and

Figure 17 is a detail of a roller mechanism.

#### DETAILED DESCRIPTION OF THE INVENTION

25       The present invention includes a radial aircraft passenger boarding bridge 310 (see Figures 13 and 14) which includes a walkway 311 having a first end 312 and a second end 313, the first end 312 for connecting to an airport building (walkway 311 is constructed of a first section 314 and a second section 315 which telescopically slides into section 314). At the second end 313 of the walkway 311 is an apron 319. A cab portion 320 is connected to the second end 313 of the walkway 311 for connecting the walkway 311 to an airplane. There are  
30       sliding means (horizontal rollers 41 and vertical rollers 42 and associated motor means, not shown) for allowing the cab portion 320 to slide laterally relative to the apron 319. The cab portion 320 has retractable floor members 31, 32 (see Figure 12). The sliding means and the

retractable floor members 31, 32 allow the aircraft passenger boarding bridge 310 to be used for both commuter aircraft and jet airplanes (when used for large commercial jet airplanes, all retractable floor members 31, 32 would be positioned so that their ends are even with the end of the non-retractable floor portions 33, as shown in Figure 12).

5 In Figure 12, there are two retracting floor members 31, one for each railing of the stairway of a commuter aircraft. There is also a retracting floor member 32 between the two retracting floor members 31 for each railing, approximately the width of the space between the two railings. Optionally, a pivoting floor can be provided to maintain a level position relative to the ground.

10 Figure 16 is a perspective view of a second preferred embodiment of the present invention, showing cab 420. Figure 17 shows a roller mechanism 441 which can be used to connect apron 319 to either cab 320 or cab 420.

A handrail 462 is provided in cab 420. Cab 420 includes retracting floor members 431, 432, 433, and 434. Retractable floor member 431 can retract, for example, about 34 inches (86  
15 cm) inward of the end of the non-retractable portion 435 of the floor of cab portion 420, and can extend forward so that its end is beyond (forward of) the non-retractable portion 435 of the floor of cab portion 420 about 8 inches (20 cm), for example. Retractable floor member 432 can preferably move beyond the rest of the floor of cab portion 420 into the doorway of a commuter aircraft until it contacts the floor of the commuter aircraft. Retractable floor member 432 can  
20 retract so that its end is, for example, about 15 inches (38 cm) inward of the end of the non-retractable portion 435 of the floor of cab portion 420, and can extend forward so that its end is beyond (forward of) the non-retractable portion 435 of the floor of cab portion 420 far enough, such as 16 inches (41 cm), to enter the doorway of a small commuter aircraft and contact the floor of the small commuter aircraft. Retractable floor member 433 can retract, for example,  
25 about 34 inches (86 cm) inward of the end of the non-retractable portion 435 of the floor of cab portion 420, and can extend forward so that its end is beyond (forward of) the non-retractable portion 435 of the floor of cab portion 420 about 8 inches (20 cm), for example. Retractable floor member 434 can retract, for example, about 15 inches (38 cm) inward of the end of the non-retractable portion 435 of the floor of cab portion 420, and can extend forward so that its end  
30 is beyond (forward of) the non-retractable portion 435 of the floor of cab portion 420 about 15 inches (38 cm), for example. Retractable floor member 434 is especially useful for use with an ATR 42 in which deplaning occurs in the back of the aircraft.

Cab portion 420 can preferably side shift about 20 inches (51 cm) in each direction from the center.

Figures 8-10 show handrail safety covers 60 to cover the floor portion where the retractable floor members 31 are retracted to allow the cab portion 320 to fit over handrails on a commuter airplane. Typically two such handrail safety covers 60 would be used. Covers 60 can be made of .080 inch (2 mm) aluminum and can have an enclosure 61 to cover a handrail 230 of an airplane, a handrail 62 to be gripped by passengers, a lip 63, a (preferably rubber) cushion 64, and mounting pins 65 which can fit in sockets in the floor of cab portion 320.

Figures 11 and 12 show a safety barrier 70 to help prevent people from walking off of the cab portion 320 of the present invention and not onto an aircraft when the cab portion 320 or 420 is used with a small plane or commuter jet. Safety barrier 70 can be, for example, 48 inches (1.2 m) high and can include a webbing 72 supported by steel poles 71

Suitable means (such as preferably electric motors and associated controls) are provided to operate the retracting floor members of the present invention and to operate the side-shift feature of the present invention.

Figure 13 illustrates well how the side-shift feature of the present invention allows the cab portion 320 of the present invention to move up to the door of an airplane with propellers without having the propellers interfere with the movement of the cab portion 320. As can be seen in Figure 13, when the cab portion 320 is properly aligned to be used with a commuter plane, the cab portion can move parallel to the longitudinal axis of the plane and perpendicular to the longitudinal axis of the walkway 311.

Retractable floor members 31 can be, for example, about six inches (15 cm) wide. Retractable floor members 31 can retract, for example, about thirty inches (76 cm). Retractable floor member 32 can be, for example, about eighteen inches (46 cm) wide. Retractable floor member 32 can preferably move beyond the rest of the floor of cab portion 320 into the doorway of a commuter aircraft until it contacts the floor of the commuter aircraft. Retractable floor member 32 can retract so that its end is, for example, about thirteen inches (33 cm) inward of the end of the non-retractable portion 33 of the floor of cab portion 320, and can extend forward so that its end is beyond (forward of) the non-retractable portion 33 of the floor of cab portion 320 far enough to enter the doorway of a small commuter aircraft and contact the floor of the small commuter aircraft.

Cab portion 320 can preferably side shift about twenty inches (51 cm) in each direction

from the center. Cab portion 320 includes two rear wall portions 81 and two side wall portions 82. There is a window 83 in one of the side wall portions 82 to allow an operator to easily view the propeller of an airplane when maneuvering the cab portion 320. The rear wall portions 81 are preferably each wider than the distance that the cab portion 320 shifts in each direction so that  
5 there will never be an open space between the outside of the apron 319 and the interior of the cab portion 320.

There is an opening 84 between rear wall portions 81 which allows passengers to pass from the apron 319 into the cab portion 320.

While not preferred, one could replace retractable floor member 32 with a stationary floor  
10 portion, though that might make it more difficult to position cab portion 320 properly and then one might need to provide some means for bridging the gap between the floor of a commuter airplane and the floor of the cab portion 320.

Cab portion 320 can be provided as part of an aircraft passenger boarding bridge 310 when the bridge 310 is built, or cab portion 320 can be added to existing aircraft passenger  
15 boarding bridges, in which case cab portion 320 can be bolted onto the existing apron of the existing bridge after the bellows and bumper are removed from the apron and rollers 41 and 42 are added to the apron.

The present invention includes a "Commuter Aircraft Adaptation Kit" or retrofit unit, for replacing old or outdated cab and bellow systems on existing passenger boarding bridges. This  
20 kit physically bolts on to an existing bridge cab face and now gives the unit the capability of servicing smaller commuter aircraft as well as larger conventional airliners.

When servicing large wide body or standard jet aircraft, the new unit herein known as the "Commuter Aircraft Adaptation Kit", would be in its normal configuration as on any standard  
boarding bridge.

25 When used with commuter turbo prop or smaller jet aircraft the unit would close in on the aircraft to close proximity then activate the retracting floor sections as to provide clearance for the aircraft's fold down door or stairs and handrails, then continue to dock up to the doorway side shifting the unit electrically until the floor or the bridge is close enough for passenger  
boarding or de-boarding maintaining an auto leveling activity.

30 The kit is also compatible on commuter bridges specifically for commuter aircraft.

The unit consists of 3 sub assemblies.

1. The first is the steel frame unit containing the mounting system rollers,



electric motors, mount for the pivoting floor section and mount of the canvas and bellows unit.

2. The second section is the bellows unit for holding up the weatherproof canvas.

3. The third is the floor section with its retracting floor sections.

5 The invention is an aircraft passenger boarding bridge which includes a cab portion which can slide laterally (see Figure 1) and includes retractable floor members (see Figure 2) to allow a single aircraft passenger boarding bridge to be used for both commuter aircraft and large jet airplanes. When used for a large jet airplane, the aircraft passenger boarding bridge would simply come out and meet the door opening of the large jet aircraft. When used for commuter  
10 aircraft, the cab would shift laterally to avoid the propeller of the aircraft and one or more of the retractable floor portions shown in Figure 2 would retract to allow the cab to move up to the opening of the small commuter aircraft without having the railing of the stairs of the aircraft get in the way (the floor portion which would otherwise hit the railing would be retracted electrically).

15 The cab unit which slides laterally and includes the moveable floor portions (the floor portions are shown differently in Figure 1 from in Figure 2 - either embodiment could work) could be bolted onto a standard passenger boarding bridge for large jets.

The apparatus of the preferred embodiment of the present invention is an aircraft passenger boarding bridge 10 which includes a cab portion 20 which can slide laterally (see  
20 Figure 1) and includes retractable floor members 30 (see Figure 2) to allow a single aircraft passenger boarding bridge to be used for both commuter aircraft and jet airplanes. When used for a large jet airplane, the aircraft passenger boarding bridge 10 would simply come out and meet the door opening of the jet aircraft. When used for commuter aircraft 200 (see Figure 7), the cab 20 would shift laterally to avoid the propeller of the aircraft and one or more of the  
25 retractable floor portions 30 shown in Figures 2 and 7 would retract to allow the cab to move up to the opening 210 of the small commuter aircraft 200 without having the railing 230 of the stairs of the aircraft get in the way (the floor portion which would otherwise hit the railing would be retracted electrically).

The cab unit 20 which slides laterally and includes the moveable floor portions (the floor  
30 portions are shown differently in Figure 1 from in Figure 2 - either embodiment could work) could be bolted onto a standard aircraft passenger boarding bridge 50 for large jets (see Figure 3).

The following is an example of how one could make an adaptation kit in accordance with the present invention.

The cab adaptation kit of the present invention can be a combination of four pieces or sub assemblies:

- 5        sub assembly one - unit frame;
- sub assembly two - canopy bellows;
- sub assembly three - swivel floor; and
- sub assembly four - retracting floor section.

10        The side shift can be, for example, 24". The floor sections could retract 18", and there are preferably 3 retracting sections. The floor could pivot 15 degrees.

#### Sub Assembly One - Unit Frame

1        The steel frame is the strong back and mounting structure for the other three sub assemblies.

15        The unit frame bolts to the aircraft passenger boarding bridge cab section after all existing bellows and bumper have been removed right up to the face wall. Six bolts, for example, hold the unit frame to the aircraft passenger boarding bridge cab wall and a bottom brace also is a bolt-on unit. Power is then connected to the unit for the side shift motor (which preferably includes a brake), canopy motors and retracting floor sections. The frame unit measures, for example, 120" x 144" x 36" with two 3" x 2" x 1/8" steel tube extending out from the base facing forward.

20        The frame can be made from 2" x 3" x 1/8" steel angle with a mounting frame of 4" x 3" x 1/4" angle steel, rollers of the V-groove type are located at the bottom of the frame which allow lateral movement or side shifting of the entire adaptation kit. The bottom frame also holds the mount and provides a place to mount the canopy bellows as well as the swivel floor sub units. The front of frame has angle mount for installing canvas material and also holds all electrical motors for

25        movement. The top rear frame also holds two 3" rollers for support 25" off each end. The frame mount also bolts the roof of cab.

#### Sub Assembly Two - Canopy Bellows

30        This bellows can have the same physical dimensions as a Jetway Systems standard seven bellow canopy and bellows unit consisting of a steel structure and a canvas covering with a pad cushion on the outside face. This unit also can also be mounted in a standard manner as on the Jetway Systems unit. However, the unit employed on this system is preferably of lighter gauge material and thus is easier to install.

### Sub Assembly Three - Swivel Floor

This unit is the part of the system which is different from all existing commercially available passenger boarding bridges and contains the last two sub assemblies, swivel floor and retracting floor sections. Other bridge floor systems may have similar movement, however, this unit is different from all others as the floor sections move forward and aft allowing for the stairs and handrails of a smaller aircraft door to dock close enough for passenger boarding and de-boarding in a more normal manner as with standard walkways used on larger aircraft. The floor section can swivel up and down at each end with the pivot point in the center location much like a child's teeter totter or bar and fulcrum with the floor section behind the pivoting section which will be hinged at two angles connecting the rear floor to the pivoting floor section without the need of a step, providing a smooth incline. Preferably electric motors provide locomotion of the floor movement. Sensors and limit switches provide protection from over-travel. The moving floor dimension is for example approximately 10' x 3' rectangle using angle steel and tubing for a frame work and a two 1/4" piano hinge for the aft floor assembly. The floor can preferably pivot 15 degrees up or down.

### Sub Assembly Four - Retracting Floor Sections

This is the section of the kit of the present invention which gives the whole unit its unique capability to be able to operate with and service smaller commuter aircraft as well as large wide body jet aircraft at the push of a button, eliminating the need to unbolt or remove add-on equipment designed to function in a like manner as the completed self-contained unit of the present invention. Incorporated in sub assembly three, the pivoting floor, is a section of three retracting floor pieces approximately 18" in length and two measuring 6" wide and a center section of 22" wide, for example. These sections can be mounted on 1" rollers on each side and have a bar track much like a desk drawer or dishwasher loading rack. These are preferably electrically operated by motors and can retract to provide clearance for the aircraft door and handrails. These retracting section are located at the front and right of the floor at the bumper area, as sections of the bumper travel with the floor sections during movement. Thus by providing a level floor and a side shifting cab to locate exactly on the aircraft door and handrails, then by retracting the floor sections the bridge will close in at a close proximity to the aircraft to allow passenger boarding and canopy closure.

### Parts List

10 aircraft passenger boarding bridge

- 20 cab portion
- 30 retractable floor member
- 31 retractable floor member of cab portion 320
- 32 retractable floor member of cab portion 320
- 5 41 horizontal rollers
- 42 vertical rollers
- 50 standard aircraft passenger boarding bridge for large jets
- 60 handrail safety cover
- 61 enclosure of cover 60
- 10 62 handrail of cover 60
- 63 lip of cover 60
- 64 cushion (preferably rubber) of cover 60
- 65 mounting pins of cover 60
- 70 safety barrier
- 15 71 steel pole
- 72 safety webbing
- 81 rear wall portions of cab portion 320
- 82 side wall portions of cab portion 320
- 83 window
- 20 84 opening between rear wall portions 81
- 91 roof portion
- 120 cab portion
- 200 commuter aircraft 200
- 210 opening of the small commuter aircraft 200
- 25 220 cab portion
- 230 railing of the stairs of the small commuter aircraft 200
- 310 aircraft passenger boarding bridge
- 311 walkway of aircraft passenger boarding bridge 310
- 312 first end of walkway 311
- 30 313 second end of walkway 311
- 314 first section of walkway 311
- 315 second section of walkway 311

319 apron of walkway 311

320 cab portion of aircraft passenger boarding bridge 310

All measurements disclosed herein are at standard temperature and pressure, at sea level on Earth, unless indicated otherwise. All materials used or intended to be used in a human being are biocompatible, unless indicated otherwise.

The foregoing embodiments are presented by way of example only; the scope of the present invention is to be limited only by the following claims.

## CLAIMS

1. An aircraft passenger boarding bridge system for large commercial jetliners having main entry doors without stairs and for smaller commuter aircraft having main entry doors having stairs, the system comprising:

5 a walkway having a first end and a second end, the first end for connecting to an airport building;

a cab portion connected to the second end of the walkway for connecting the walkway to an airplane, the cab portion including a floor portion, a wall portion, and a roof portion;

10 the floor portion of the cab portion including first and second retractable floor members which are movable between a first retracted position which allows the floor portion of the cab portion to abut a smaller commuter aircraft which has a main entry door having stairs, and a second extended position in which the retractable floor members abut a large commercial jetliner having a main entry door without stairs.

15 2. The system of claim 1, further comprising a third retractable floor member which is movable between a first retracted position and a second extended position in which the third retractable floor member extends into a door opening of a smaller commuter aircraft which has a main entry door having stairs.

20 3. The system of claim 2, wherein the third retractable floor member is also movable to a third retracted position, in which it is more retracted than when in the first retracted position, to facilitate movement of the cab portion.

4. The system of claim 1, further comprising sliding means for allowing the cab portion to slide laterally with respect to the longitudinal axis of a smaller commuter aircraft when the system is aligned to be properly used with the smaller commuter aircraft.

25 5. The system of claim 1, further comprising movable barrier means for helping to prevent people from walking off of the cab portion but not into the smaller commuter aircraft when the system is used with a smaller commuter aircraft.

6. The system of claim 1, further comprising handrail safety covers for covering openings created in the cab portion when the first and second retractable floor members are in the first retracted position.

30 7. The system of claim 1, further comprising bumper means for abutting the jetliners and aircraft.

8. The system of claim 1, further comprising bellows means for providing a seal between

the cab portion and the jetliners and aircraft.

9. An aircraft passenger boarding bridge apparatus for large commercial jetliners having main entry doors without stairs and for smaller commuter aircraft having main entry doors having stairs, the system comprising:

5       a cab portion connectable to the second end of a walkway having a first end and a second end, the first end for connecting to an airport building, the cab portion when connected to the second end of the walkway serving to connect the walkway to an airplane, the cab portion including a floor portion, a wall portion, and a roof portion;

10       the floor portion of the cab portion including first and second retractable floor members which are movable between a first retracted position which allows the floor portion of the cab portion to abut a smaller commuter aircraft which has a main entry door having stairs, and a second extended position in which the retractable floor members abut a large commercial jetliner having a main entry door without stairs.

15       10. The system of claim 9, further comprising a third retractable floor member which is movable between a first retracted position and a second extended position in which the third retractable floor member extends into a door opening of a smaller commuter aircraft which has a main entry door having stairs.

20       11. The system of claim 10, wherein the third retractable floor member is also movable to a third retracted position, in which it is more retracted than when in the first retracted position, to facilitate movement of the cab portion.

12. The system of claim 9, further comprising sliding means for allowing the cab portion to slide laterally with respect to the longitudinal axis of a smaller commuter aircraft when the system is aligned to be properly used with the smaller commuter aircraft.

25       13. The system of claim 9, further comprising movable barrier means for helping to prevent people from walking off of the cab portion but not into the smaller commuter aircraft when the system is used with a smaller commuter aircraft.

14. The system of claim 9, further comprising handrail safety covers for covering openings created in the cab portion when the first and second retractable floor members are in the first retracted position.

30       15. The system of claim 9, further comprising bumper means for abutting the jetliners and aircraft.

16. The system of claim 9, further comprising bellows means for providing a seal

between the cab portion and the jetliners and aircraft.

17. An aircraft passenger boarding bridge system for large commercial jetliners having main entry doors without stairs and for smaller commuter aircraft having main entry doors having stairs, the system comprising:

5 a walkway having a first end and a second end, the first end for connecting to an airport building;

a cab portion connected to the second end of the walkway for connecting the walkway to an aircraft, the cab portion having sliding means for allowing the cab portion to slide laterally with respect to the longitudinal axis of an aircraft and having retractable floor members.

10 18. The system of claim 17, wherein the sliding means and the retractable floor members allow the system to be used for both smaller commuter aircraft and large commercial jetliners.

19. A passenger boarding bridge apparatus comprising:

15 a cab portion connectable to a passenger boarding bridge walkway for connecting the walkway to an airplane, the cab portion having sliding means for allowing the cab portion to slide laterally and having retractable floor members.

20. The apparatus of claim 19, further comprising means for bolting the cab portion to a passenger boarding bridge walkway.

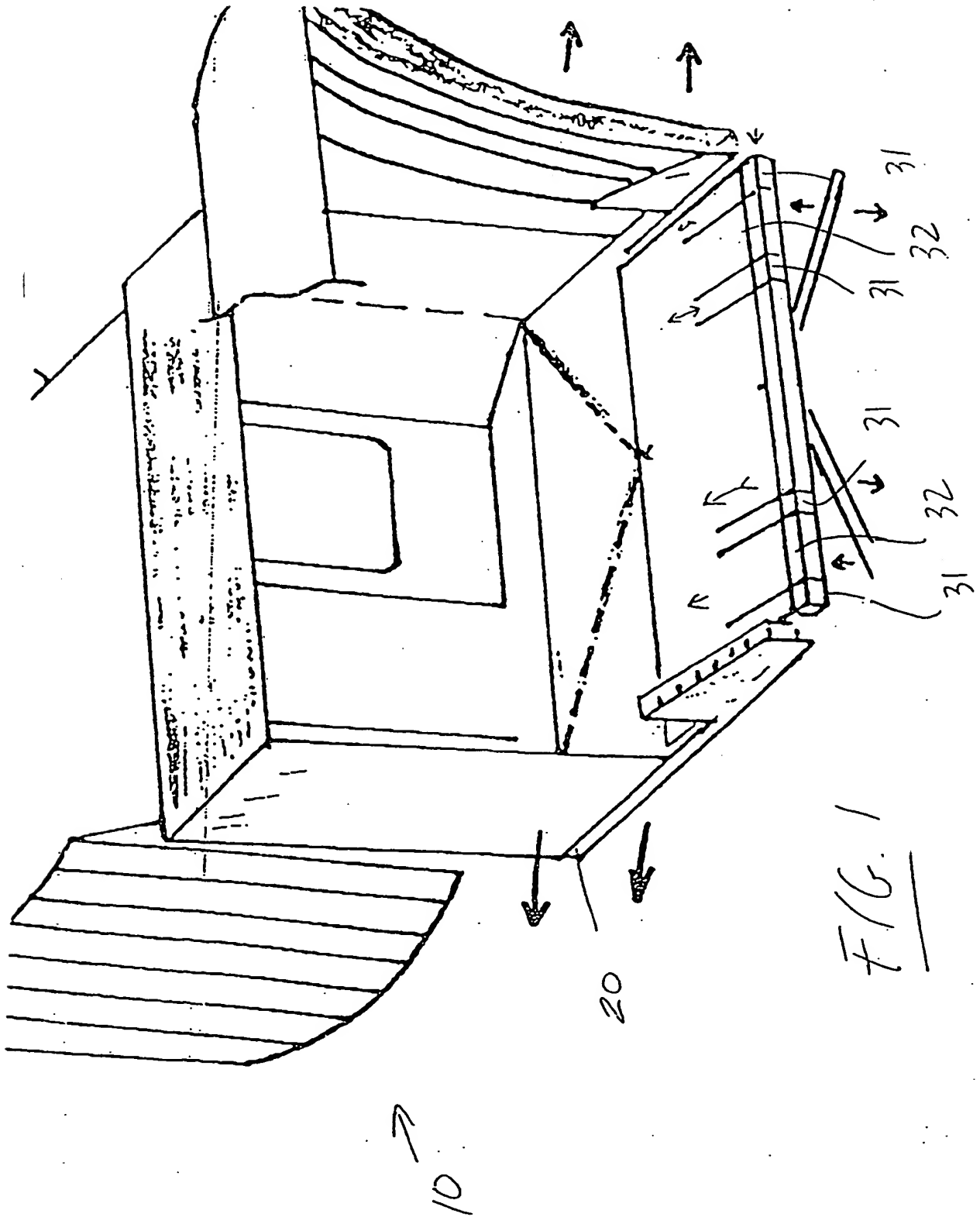
21. A cab system having a leveling floor, three retracting floor sections and side to side movement means, attachable to a bridge walkway to enable the walkway to service standard jet aircraft and smaller commuter aircraft with the same unit without adding or removing equipment, and which is a permanent fixture of the bridge and not a removable sub system for each aircraft.

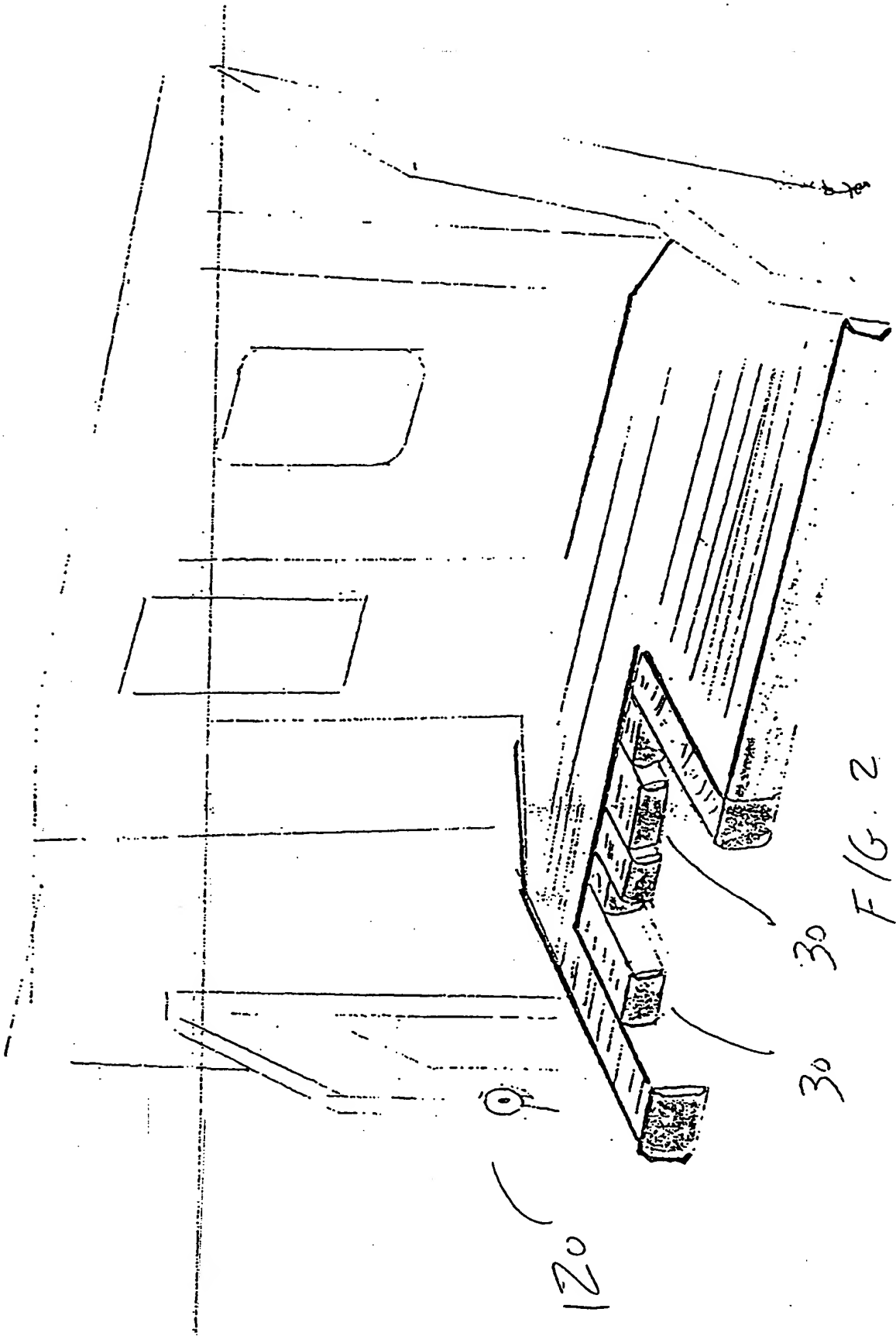
22. The cab system of claim 21, wherein the retracting floor sections and side to side movement means allow the cab system to be used for both commuter aircraft and jet airplanes.

25 23. The invention of claim 19, wherein the retracting floor members allow the cab portion to closely approach a small commuter aircraft.

24. The invention of claim 19, wherein the retracting floor members include two members which are sized to allow the handrails of a small commuter aircraft project through the floor of the cab portion.







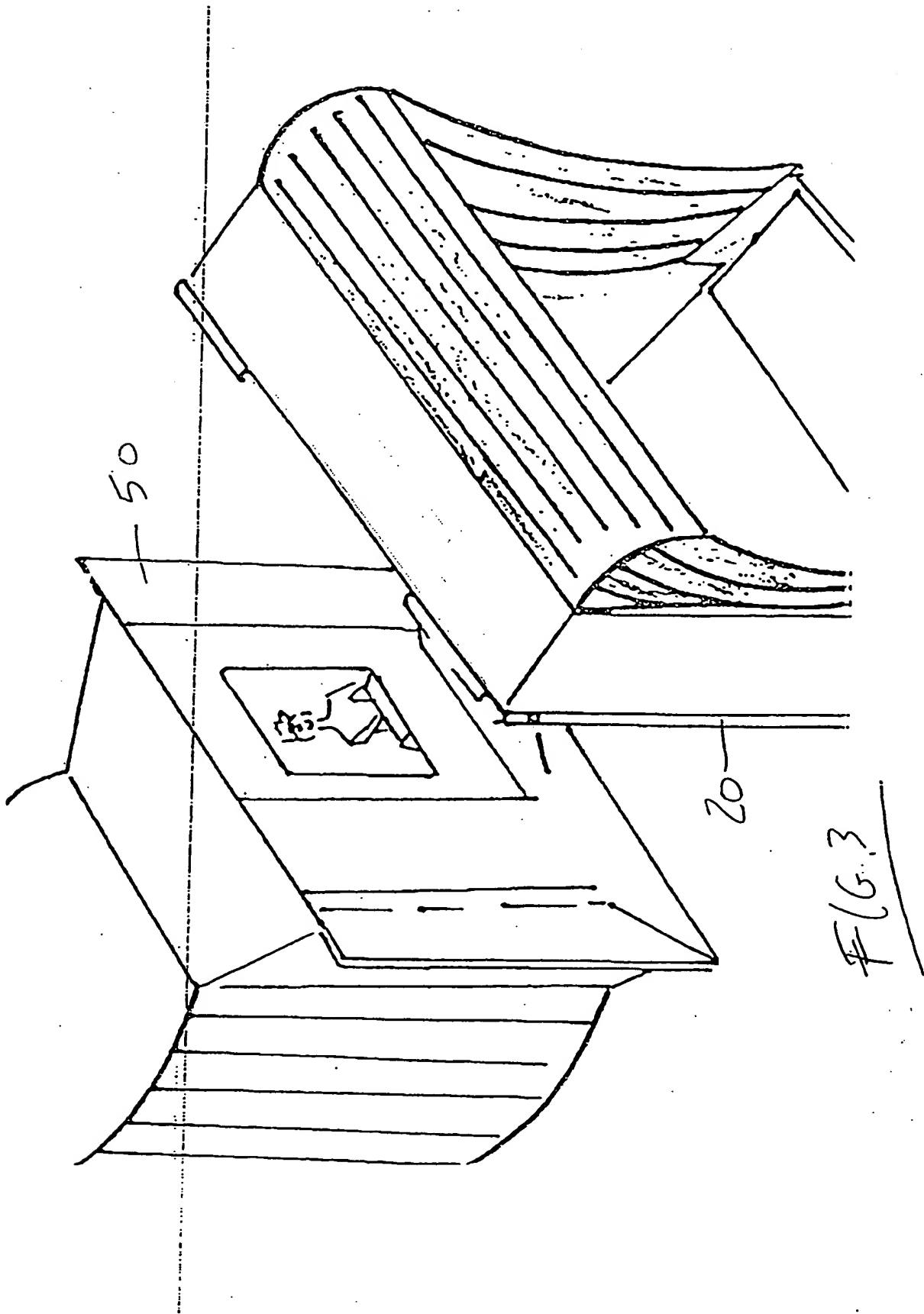


FIG. 3

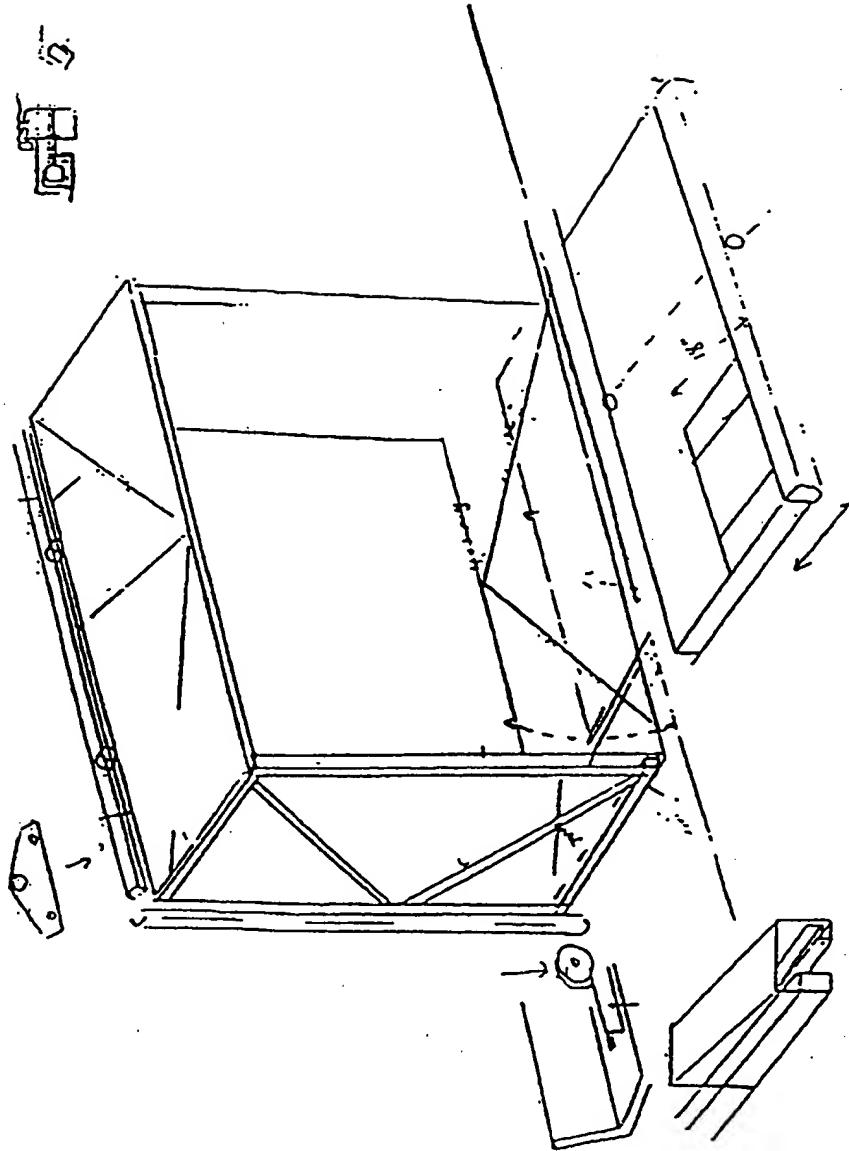
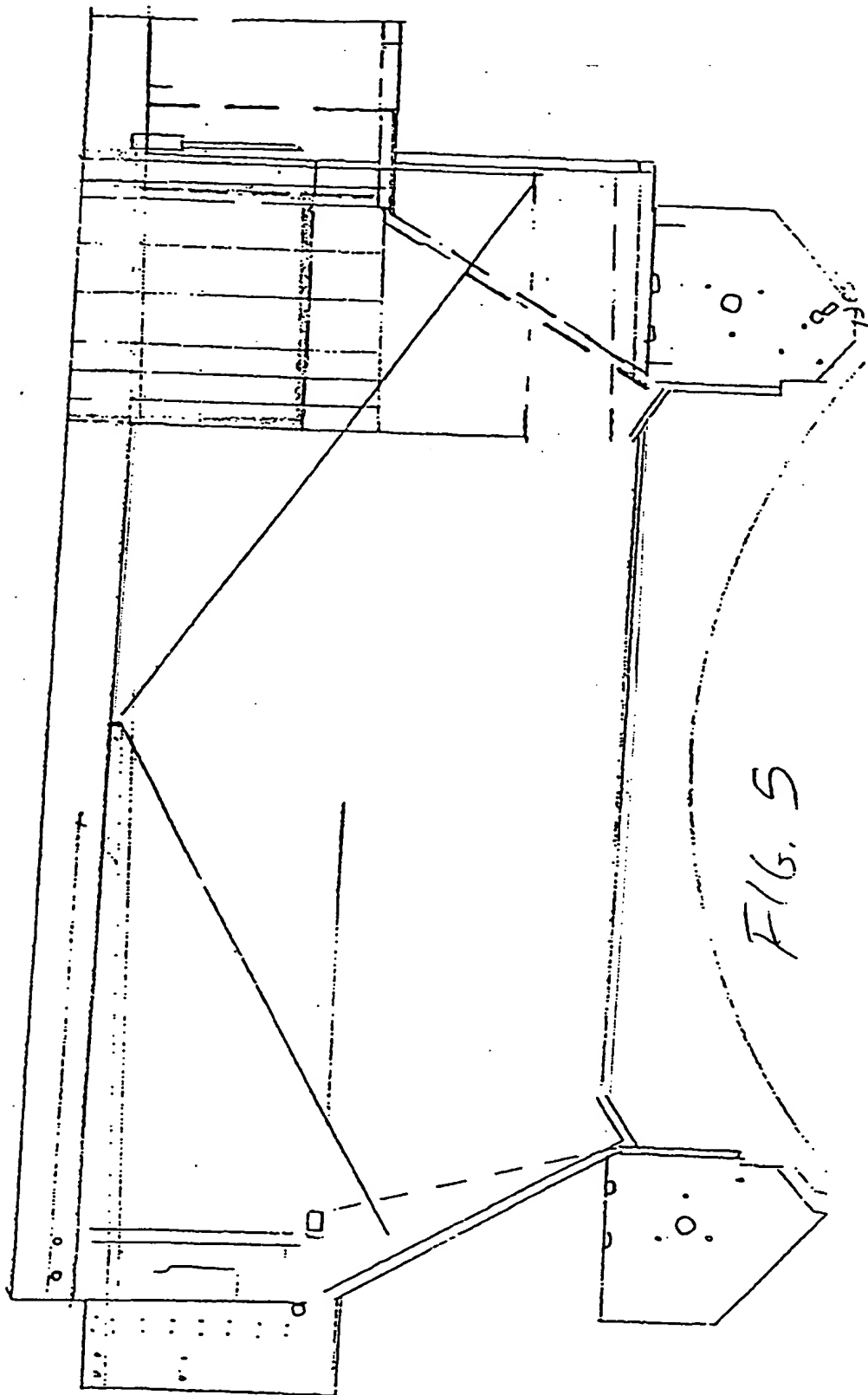
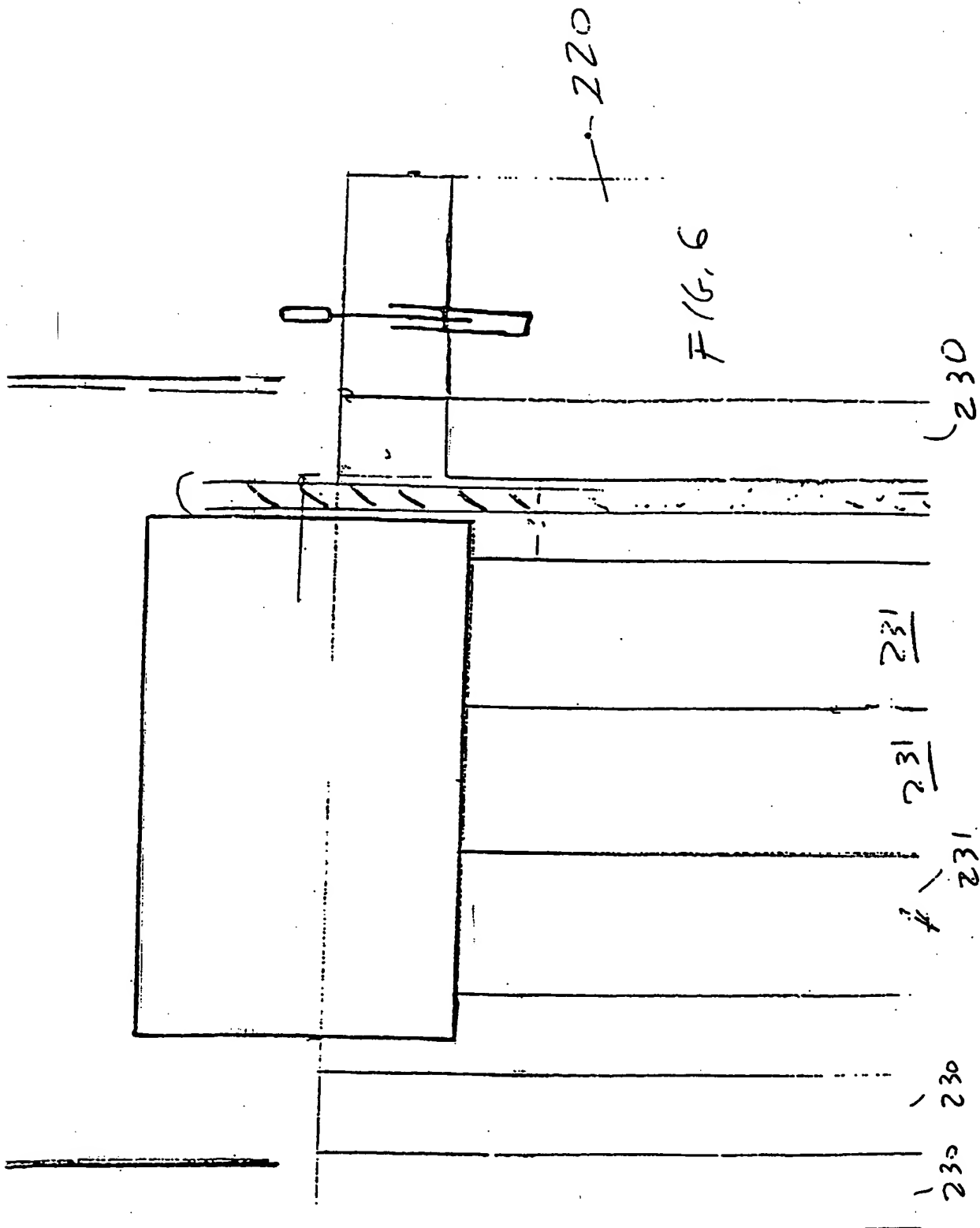
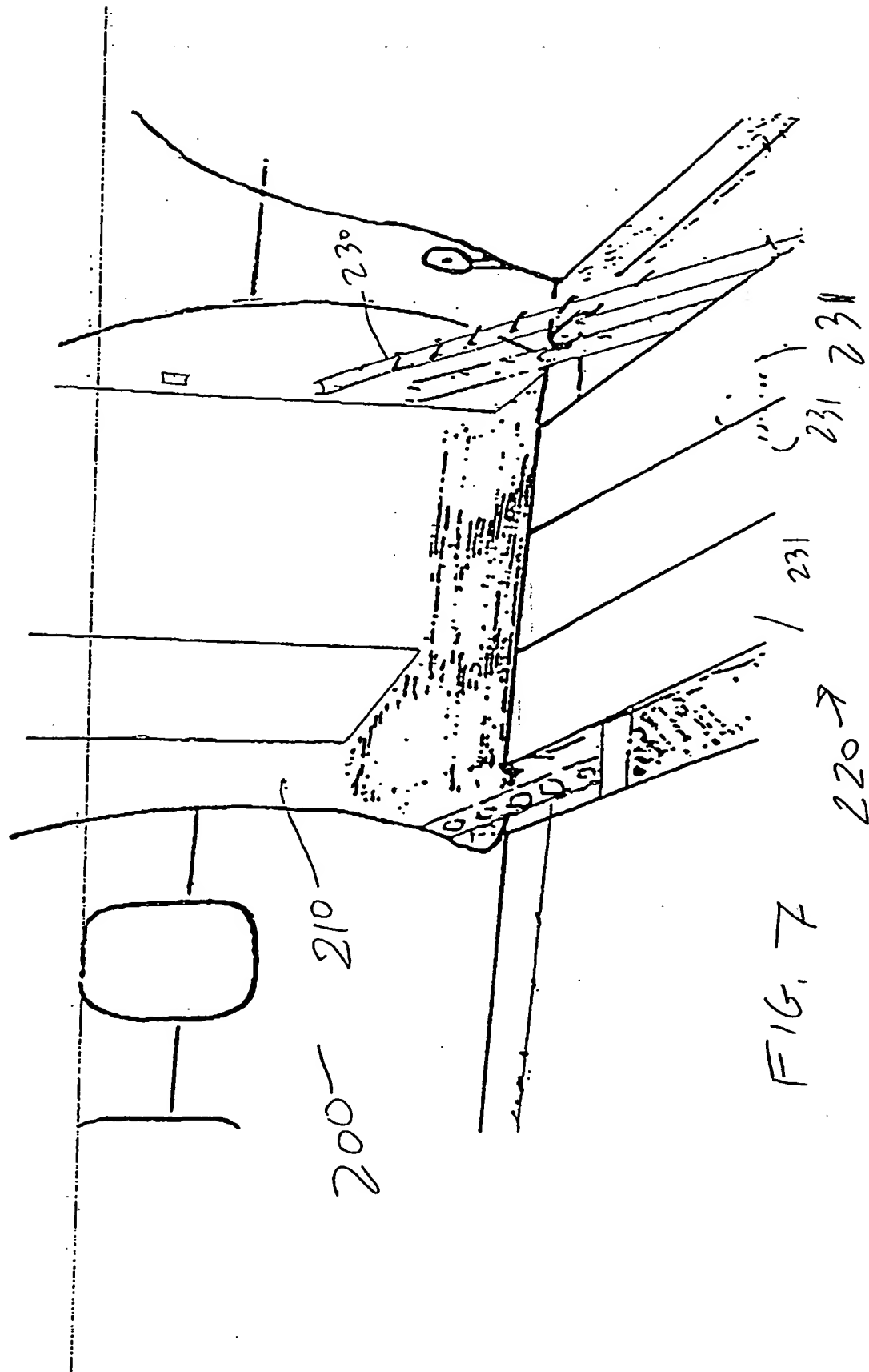
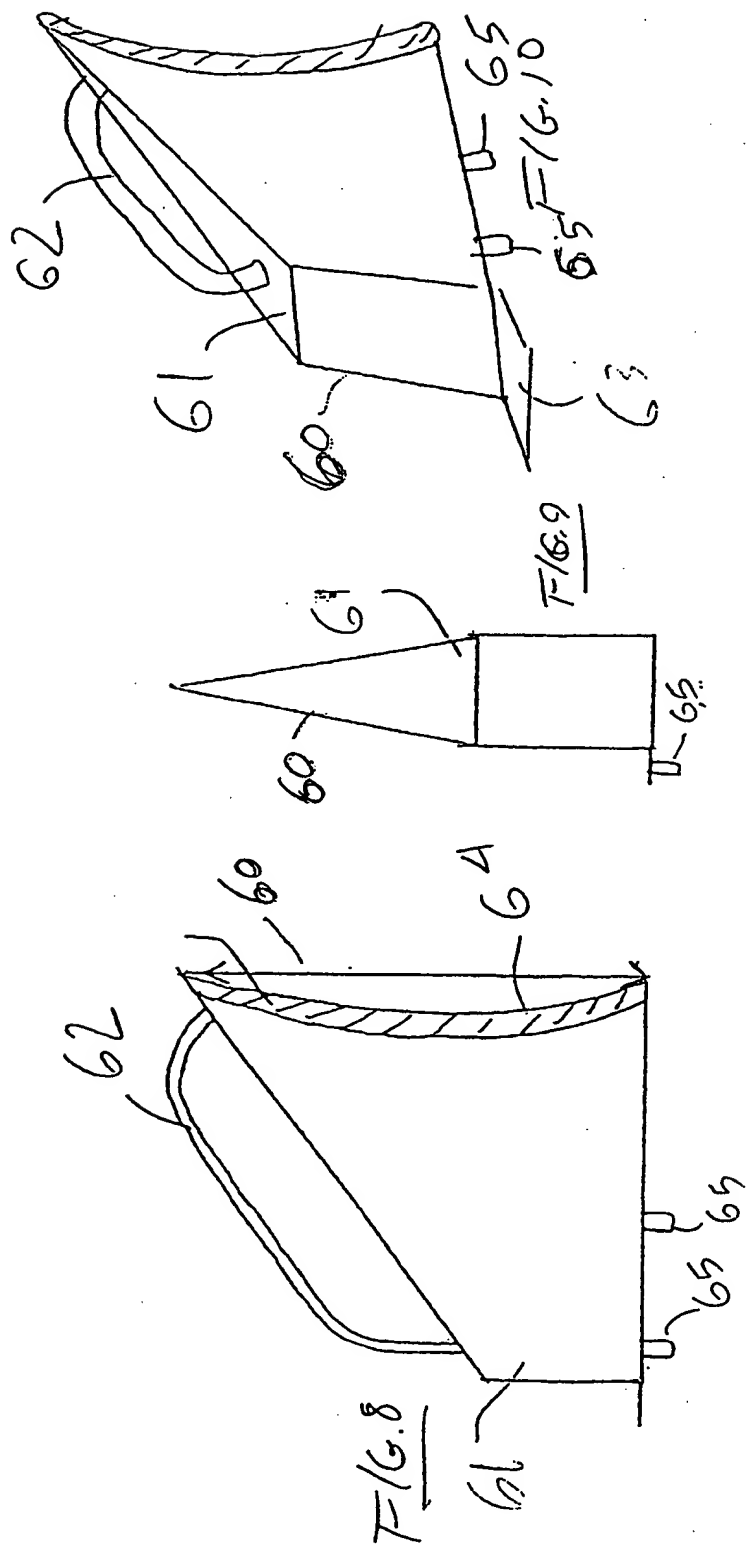


FIG. 4

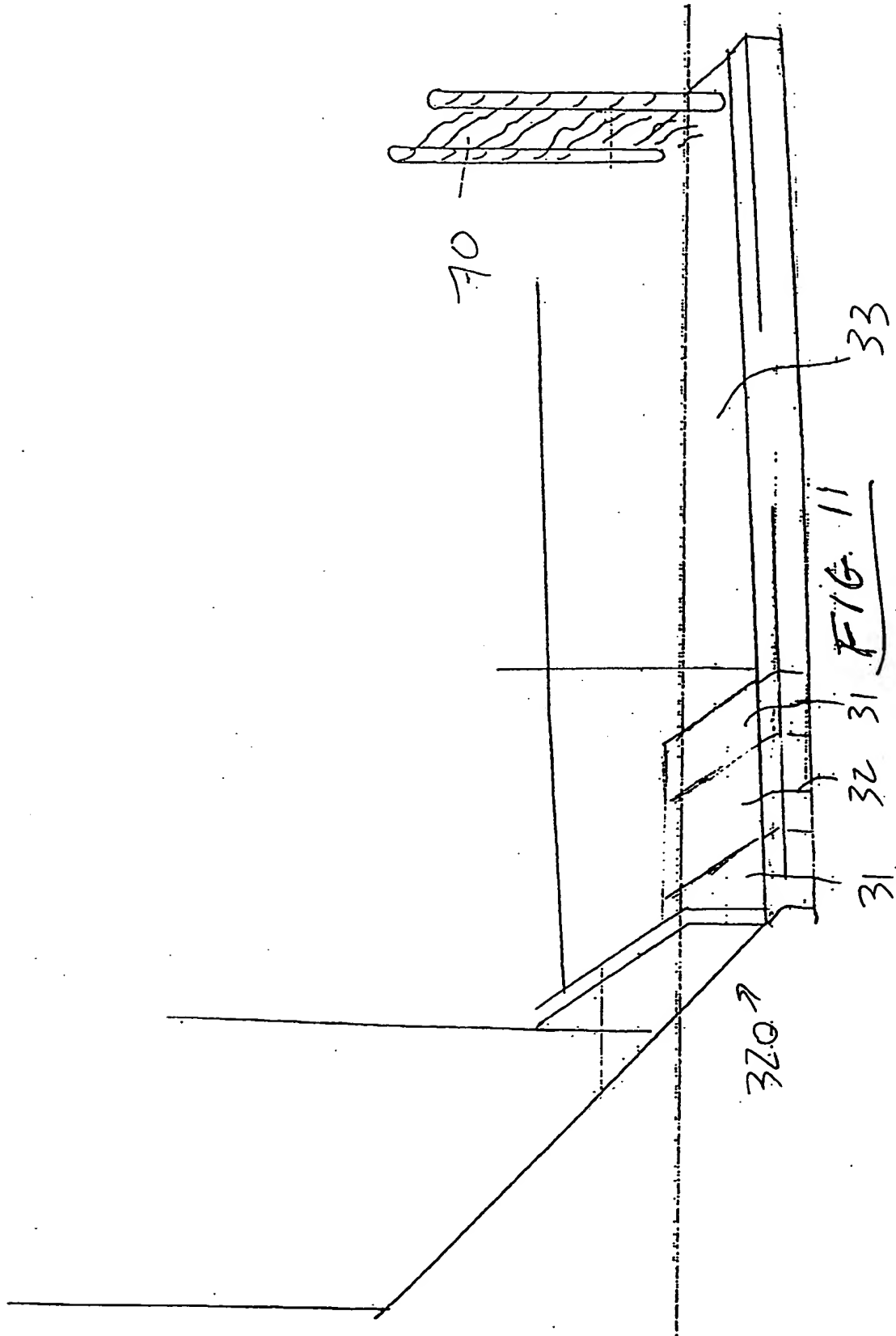


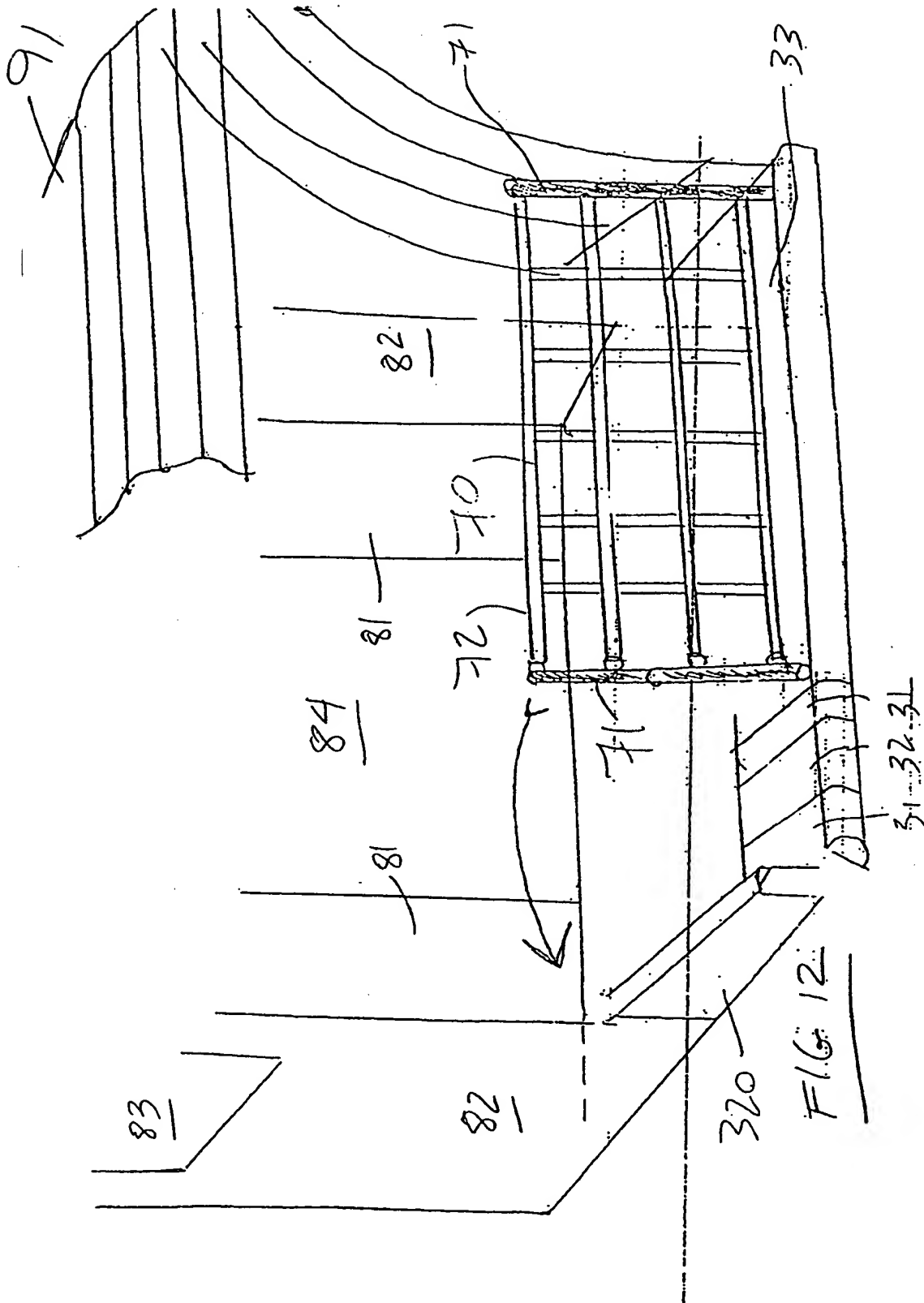


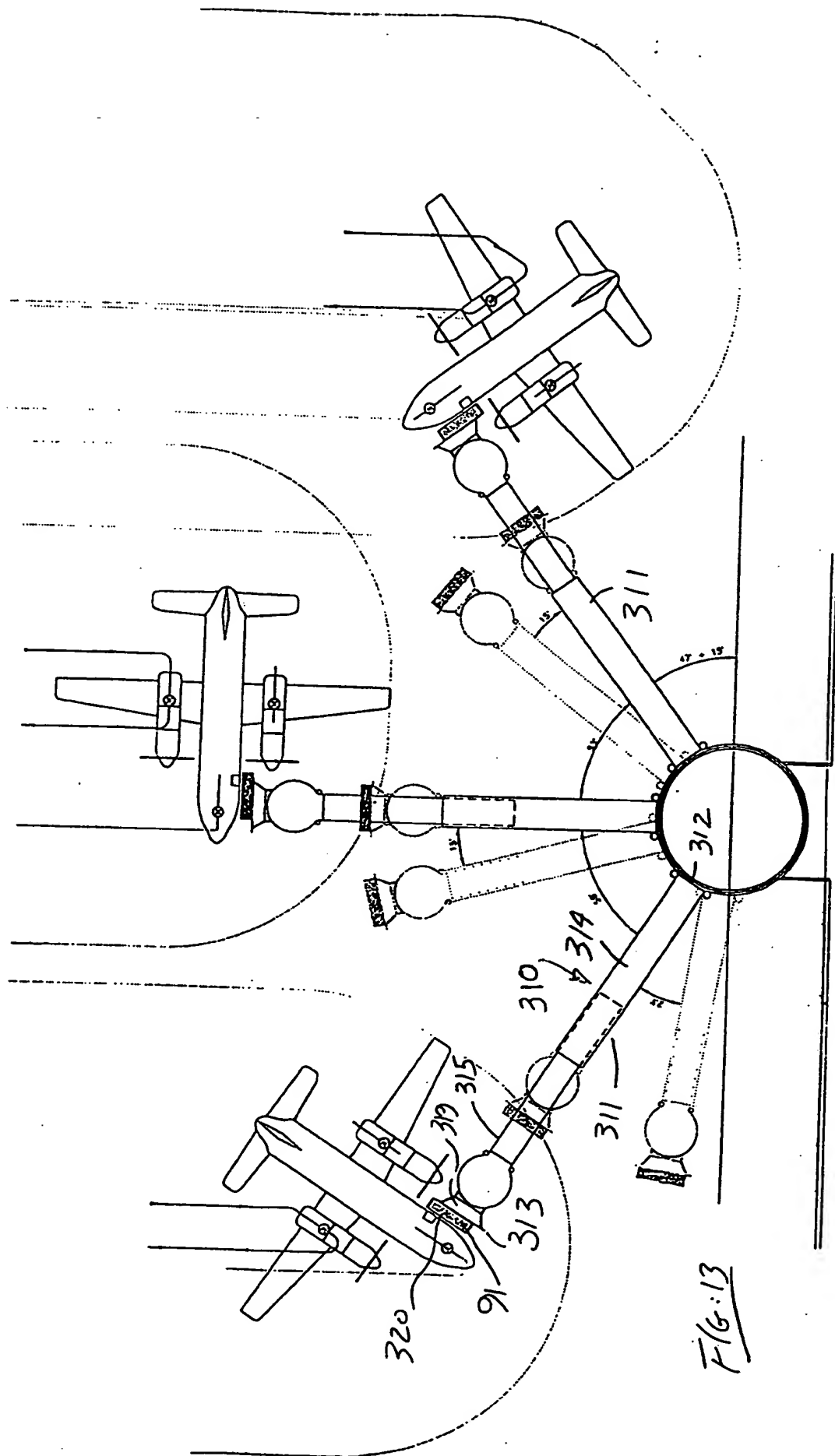


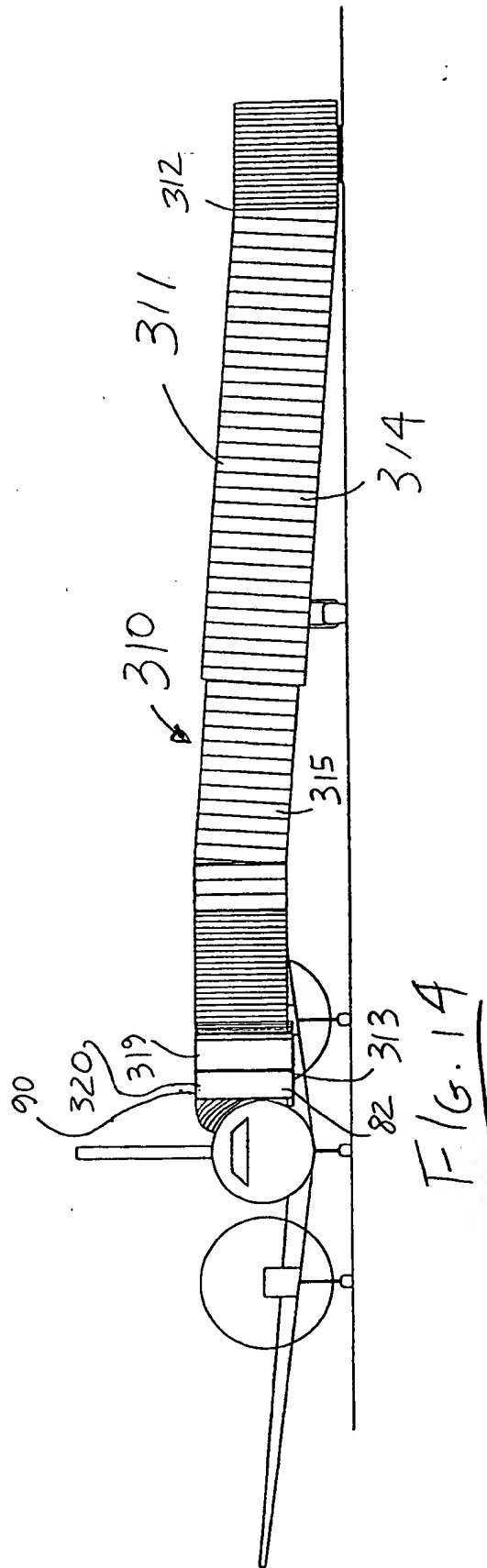












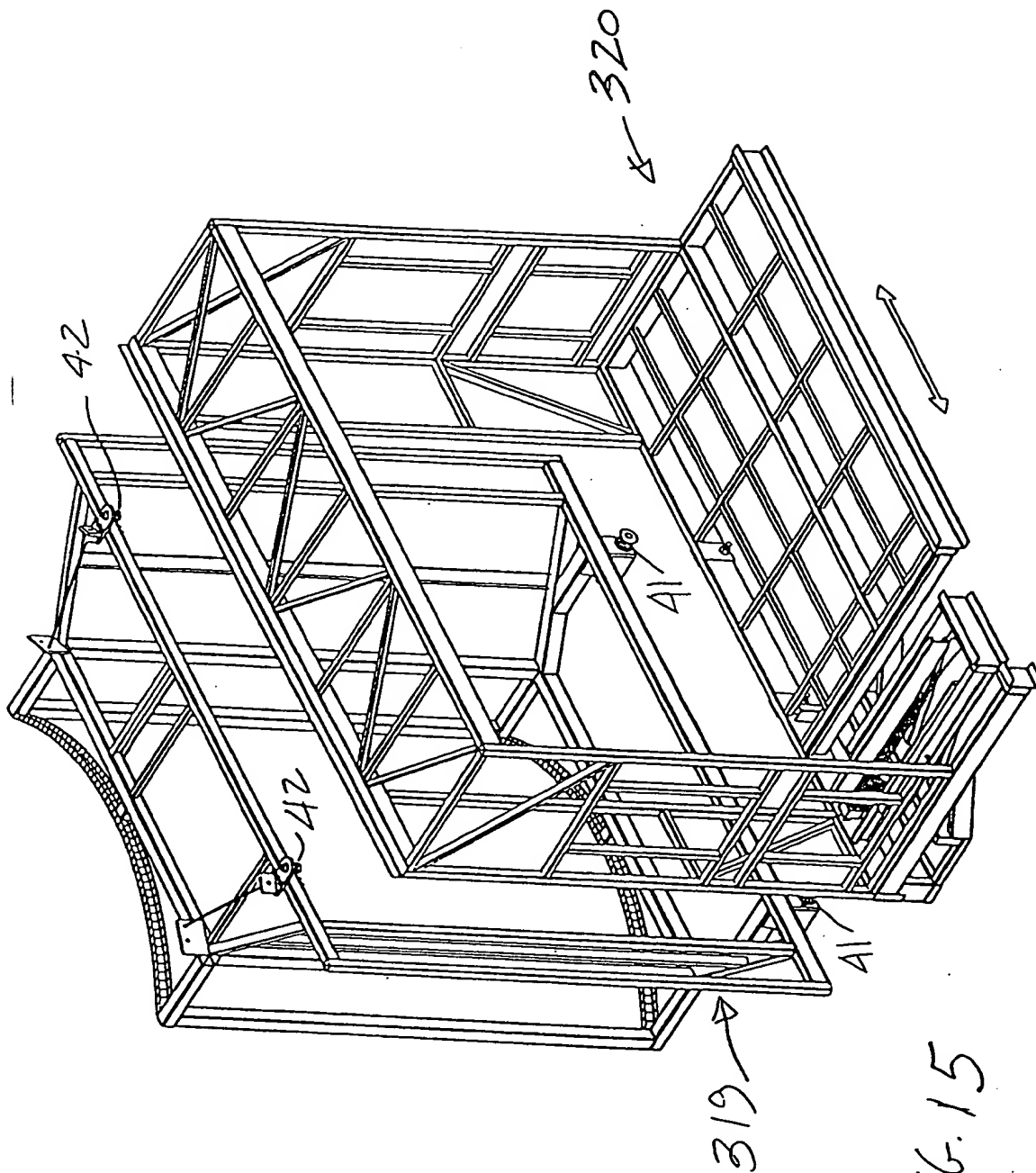


FIG. 15

